THE RELATIONSHIP BETWEEN THE LONG-TERM RATE OF INTEREST AND CAPITAL OUTLAY IN SELECTED INDUSTRIES 1933-1939

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CHAPTER 1

INTRODUCTION

Significance of the Study

The ensuing study has been undertaken to determine how investment changes as long-term interest rates change. In the comparative analysis of firms listed under the broad classification of industrials and railroads, an effort will be made to ascertain whether firms expended more on plant and equipment when rates were relatively low, or less, when rates were high, and/or considerable amounts irrespective of the level of long-term interest rates. Continuing the examination, the analysis will be extended to incorporate interest rates and investments into a concept to establish what influences, if any, it may exert on changes in the business cycle.

In strict economic theory, four periods comprise the business cycle. They are, prosperity, recession, depression and recovery. The time of occurrence is not necessarily in the above order, that is, prosperity may not come first; but the order in which they appear, generally follows this prescribed pattern. In the prosperity phase of the cycle, the economy approaches a state of full employment. For some economists, full employment is said to exist when the basic factors of production, land, labor and capital, are employed at their optimum capacity. The following explanation is given to clarify this generally accepted definition. The term, "optimum capacity," must first be defined. There are at least two meanings of this term. First, if all of these factors are employed to any degree, it may be argued that they are being used to their optimum capacity for any given situation. The second connotation of fullest capacity is that these factors

are employed so that any alternative use will not bring about any proportionate increase in their usefullness. There is labor, for example, with certain technical skills, employed in service capacities. Another example is the investment of capital in individual plows when the return on them, keeping everything but labor constant, would be greater if invested in a plow machine or its equivalent. The same types of examples could be applied to land. Present under these illustrations, are elements of both definitions of optimum capacity. Nevertheless, full employment for our purposes, will be associated with labor. Hence, at levels of full employment, all persons constituting the labor force, except approximately 5%, are employed. Those individuals comprising the 5% are involuntarily unemployed.

Recession tends to follow a period of prosperity. Generally, unemployment of labor and capital begin to exist. Then, the depression cycle "moves around." Unemployment of these factors is widespread; investments are relatively low; and a host of other factors are present which contribute to the disequilibrium position of the economy as a whole. Later, the money supply begins to increase, and/or investment expenditures rise and employment increases. Now, the economy is in a state of recovery.

This brief synopsis of the business cycle is presented partly as a background for the data which follow and it also serves to establish the basis for selecting the period of 1933 through 1939 as the most appropriate one for this investigation. First, it is the span following a depression and preceding defense expenditures. Since all of the cycles could be considered normal under conditions pertaining thereto, forces operating during this stage represent no known abnormal or random traits, such as those which existed after 1941 which caused our economy to approach a position of prosperity. The second reason, which enhances the significance of this study,

underlies changes in investment patterns in the last twenty years. One striking change has been the increased emphasis on debt financing[1] as opposed to external equity financing.[2] Therefore, an attempt is made to determine if this has resulted largely from the decline in long-term interest rates beginning in the 1930's.

Scope

Certain limitations prevail in a study of this type. For example; results will not actually prove that firms withhold capital funds, for investments, until interest rates fall. Another restriction is the fact that part of the study will be theoretical and hence, would not necessarily represent an expression of situations which actually may exist.

Even though only a few firms have been selected for the investigation, they are quasi-monopolies and consequently occupy a position of leadership in their respective fields and possibly other areas through directorate and/or political control. As a result, there is an inclination for smaller entrepreneurs to "follow the leader" in the long-run or be "driven" from the market. Therefore, the sample may reflect a normal trend of the industries affected.

Previous Studies

Beginning in 1920 and extending through November, 1937, The Harvard

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1 An act of financing by borrowing funds primarily from commercial institutions, if short-term borrowing, or from investment concerns, if long-term borrowing, on a principal plus interest basis.

2 The financing of enterprises with ownership capital; that is, the selling of securities such as stocks and/or the flotation of long-term bond issues. Equity capital is also referred to as risk capital.

Graduate School of Business Administration developed a case study on problems arising when business executives made various decisions. The investigation involved the sampling method and was composed of 13,119 cases. Executives from different firms (not recorded) completed questionnaires. The case study dealt with the influence of interest rates upon the investment decisions of businessmen. Of the 13,119 cases, fewer than 35 took complete cognizance of the interest rate factor.

Many economists have sought to link interest rates with changes in the business cycle and some, such as Keynes and Fisher, have related them to patterns of investment.

Methods Used in the Investigation

The analysis is divided into two parts. Data for part one are largely theoretical and deal with interest rates and investment. An effort has been made to outline various approaches to the determination of interest rates; their effect on investments and the effect of both on the business cycle. Part two is primarily statistical in nature and chiefly embodies material taken from two sources, namely, Moody's manuals and the annual reports of some of the firms in the investigation. It is an empirical approach.

CHAPTER II

NATURE OF INTEREST

Definitions

In a study of interest and interest rates, persons with seemingly different views, consciously or unconsciously, present similar interpretations. Generally, interest is considered the price paid for the use of cash or its equivalent. "The interest rate" is primarily considered as the ratio of payment for a "loan of money per unit of money per unit of time;"[3] time being computed on an annual basis. If the loan is discounted, a method practiced by most banks, there is both a nominal rate and a real rate of interest. By discounting a loan, an amount equal to the quoted rate of interest is deducted from the principal. If this rate is 6% and loan is for $100.00, then $6 will be deducted; the borrower receiving $94.00. On payment of said loan, the borrower is required to pay $100.00. Thus, the nominal rate is 6% and the real rate is 6/94 or 6.38%. Through this practice, banks are realizing a higher rate of interest than many borrowers are led to believe.

Therefore, any admitted differences serve to lie in the determination of the interest rate. Interest analysts may be divided into two broad groups, namely, the monetary and non-monetary writers or the classical and anti-classical theorists. The classical group includes Ricardo, his predecessors and followers of his doctrines. The non-classical division is dominated chiefly by the Keynesian approach. The monetary group, substituted for the

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[3] Harold M. Somers, "The Theory of Interest," Quarterly Journal of Economics, (Mass., 1940), p. 499.

non-classicals, acknowledges the Liquidity Preference Theory and the Loanable Funds Theory, whereas the Time Preference and Productivity of Capital Theories represent an outgrowth from the non-monetary or classical group. Notwithstanding this, there are those who attribute the determination of "the interest rate" to a combination of some or all of the previously listed factors.

Approaches To The Determination of Interest Rates: Bawerk, Fisher and Keynes

The Time Preference Theory, also known as Agio or Psychological or Human Impatience Theory, has taken on a general meaning of preference for present goods over future commodities. For Bawerk, the exponent of this theory, there are two basic factors which underlie the analysis. The size of income is one factor. Assuming that there is a systematic unevaluation of the future, individuals would tend to underestimate their future income and hence place a higher preference for present goods over future goods and services. Total income for the economy is fixed, but the size of individual income may fluctuate; depending on the amount loaned or borrowed. Secondly, there is the degree of risk which is attached to the future. Present events are commonly known whereas death, representing a future event, is fairly uncertain as to the exact time of occurrence.

Therefore, to forego present pleasures for future expectations, a reward must be forthcoming. That reward is an interest payment for abstaining from current consumption, which is also in accord with Senior's Abstinence Theory of Interest.[4]

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[4] James Moffat et al., Economics-Principles and Problems (New York, 1947), p. 546.

The reward, for abstaining from immediate pleasures, will be over and above the original amount borrowed, in a monetary economy, ceteris paribus, or there will be no basis for one to alter his present pattern of spending. Thus, the problem is to induce people to accelerate individual savings; lowering their time preference, and hence increasing savings for the whole economy. Savings will subsequently become investments. Furthermore, an interest "reward" becomes necessary or a part of the inducement philosophy.

Continuing this analysis, the rate of interest may fall to zero or it may become negative in a real goods economy. For the rate to become negative under a monetary analysis, one must prefer future over present goods. Under a real goods economy, the future is also expected to yield less than the present. However, the number of persons who may prefer future over present goods, is relatively small or infinitesimal. Therefore, the determination of the interest rate, under the time preference theory, assumes a preference for present over future goods.

Under the Productivity Theory of Interest, it is presumed that most durable goods are reproducible, and therefore interest becomes a payment for the productivity of capital. The rate, which measures the productivity of the item, may be positive or it may be negative. The type of rate (positive or negative will depend on the particular method used in analyzing the productivity approach. For those who advocate a perpetual positive rate under this approach, we assume a positive return on the initial capital investment in perpetuity.

However, by employing another variation of the productivity approach, the rate of interest could conceivably become negative. When applying this method, all factors of production, except capital, are kept constant. It is assumed that positive returns are received from the initial capital

investment. Varying capital, ceteris paribus, and continuously applying it at a rate in excess of replacement costs, eventually leads to negative returns. Such returns are inevitable since capital investment, after our initial employment, is constantly being "overcrowded;" that is, additional outlays, above replacement, do not bring about increases in income. Thus, at some point, the cost of capital will exceed the return on the investment thereby creating a negative rate of interest.

It is also apparent that the long-term rate of interest (under the productivity approach) is considered in the first method. This is so because all factors of production have been varied and in the long-run analysis, all factors are variables. To argue that the rate could become negative presupposes two conditions. First, it is necessarily a short-run analysis since some factors will be fixed or kept constant, and secondly, the type of economy is basically one of real goods.

At this particular point, we shall attempt to clarify the term, "the rate of interest." An implication of this clarification is presented in the preceding investigation and should become more apparent in the liquidity preference theory which follows.

Moving out from the basic supply and demand analysis, there could never be one rate or "the rate of interest," in a competitive economy, unless the supply and demand curves were permanently elastic. Therefore, "the rate of interest," as used in this analysis and perhaps understood by others, means a family of rates for a particular scale.

The Liquidity Preference approach to interest is associated with Keynes.[5]

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[5] John Maynard Keynes, General Theory of Employment, Interest and Money (New York, 1935), p. 166.

It is the desire to hold cash or its equivalent rather than part with it. When one desires to reduce his liquidity, he is rewarded with interest. Thus, interest becomes a payment for not hoarding or parting with liquidity.

This monetary theory, predicated upon the demand for and supply of money, consists of three motives. The first one is the transactions motive. Regardless of the individual, he will need cash or its equivalent to meet his personal or business obligations. These responsibilities may be day to day or bi-monthly or monthly transactions, but nevertheless, they will exist. The amounts needed for the transactions will vary probably from person to person but will invariably depend on the size of one's income and its interval of receipt. Generally, the larger one's income, the higher his transactions. Secondly, there is the precautionary motive. In addition to holding money for current transactions, there is a sum held for emergency uses. On a balance sheet, this sum may be expressed as "reserve for contingencies." This is a precautionary step where a sum is held to meet, say, bad debts. Keynes has designated M_1 to represent these two motives which are primarily functions of the level of income and do not vary with the rate of interest. The third, the speculative motive, is related to gains in commodity and security markets from the holding of cash. This motive is represented by M_2 and varies with the rate of interest. Even though no income is forthcoming from these idle balances, people maintain them because of the speculative motive. Thus, the amount of money that one would hold, in the form of idle balances at any given time, equals M_1 plus M_2.

The rate of interest is the price which equates the liquidity preference with the available quantity of cash. The higher the rate of interest, the lower the liquidity preference, and vice-versa. The supply and demand curve may be used to illustrate the point or it may be shown as in Table 1.

TABLE 1

SCHEDULE OF INTEREST RATES AND LIQUIDITY DEMAND

Interest Rates	Liquidity Demand Schedule
1	$8,000
2	7,000
3	6,000
4	5,000
5	4,000
6	3,000

The approach implies that monetary authorities can stimulate investment, on the part of entrepreneurs, by increasing the supply of money. In doing so, the rate of interest is expected to fall. If, say at 2%, the liquidity preference or demand curve is infinitely elastic, then an increase in the money supply will not lower the rate of interest.

Short And Long-Term Interest Rates

For this investigation, we are primarily concerned with the long-term rate of interest. Accordingly, it is appropriate to make a distinction between short and long-term rates. Before making this differentiation, we shall present some factors which affect these two rates.

There may be three factors affecting the short-term rate; namely, accurate prediction, position of borrowers and lenders and the absence of investment costs. Let us assume a town with only one commercial bank that provides the only source of loanable funds. Then, this bank is in a position to practice monopolistic tendencies since under monopoly, there is presumed to be only one seller. As a result, it may be able to set or influence rates; within the maximum rate which is set by banking legislation. In doing so, it

may deal primarily with the reserves, which are influenced by regulations of banking authorities and/or magnitude of loans. If loans become increasingly high, creating a tendency to lower reserves, the rates may be raised. When the volume of loans decrease and reserves begin to "swell," rates will probably fall.

A second element which may be considered as a factor under the short-term rate is the alternate position of borrower and lender. Theoretically, prospective borrowers could become lenders and vice-versa; that is, those who seek loans, borrow under existing conditions where they could easily lend. Since no costs of investments will be incurred, the amount wanted would tend to be relatively small.

A third factor, absence of investment costs, is probably self-explanatory. Any influence on short-term interest rates, positive or negative, will not be related to an increase or decrease in investment expenditures, for investment during this period will not be undertaken.

Next, we will consider factors affecting the long-term rate. First, the long-term rate tends to move towards an average of the short rate and secondly, it does not fluctuate as widely as the short rate. Note the contents of Table 2.

TABLE 2

FLUCTUATION OF SHORT AND LONG-TERM RATES

Short-Term Rates	Long-Term Rates
3	
2	4
7	$4\frac{1}{2}$
9	8
6	$7\frac{1}{2}$
5	$5\frac{1}{2}$

A supplementary explanation should help to clarify the table. Mr. Lutz has eliminated wide fluctuation by including in present long rates, future changes in the short rates.[6] This leads us back to the number one factor, an arithmetic mean of short-term rates, which makes our number two factor possible. By accepting this average, prediction, to some degree, is also possible for the long-term rate; which Lutz fails to acknowledge. What does remain however, is the fact that the long rate, under these assumptions, does not fluctuate as widely as the short rate.

If the gap between the short rate and long rate is very wide (assuming that the long rate is comparatively high), then, short-term borrowing will rise over long-term borrowing to facilitate purchases of long-term securities. The increase in the money supply on one hand, ceteris paribus, will lower the long-term rate and simultaneously, the excessive short-term borrowing on the other hand, ceteris paribus, will cause a rise in short-term rates. Therefore, even though bank officials may maneuver their reserves to influence short-term rates, such rates are also indirectly affected by changes in the long-term rates.

As an outcome of the preceding forces operating under the short and long-term rates, it is concluded that the main difference between these rates is the degree of risk. In illustrating, let us assume that one short-term and one long-term bond are purchased. The short-term bond is for 60 days and bears 2% interest. The long-term bond is for 40 years and bears 4% interest. After 50 days, the interest rate on both bonds rises by 2%.

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6 F. A. Lutz, "The Structure of Interest Rates," Quarterly Journal of Economics, LV (November, 1941), p. 37.

The short-term bearer can cash in for the principal at the end of ten days and purchase a short-term bond at the higher rate of interest. The long-term bearer must hold his bond for approximately 39-5/6 years before he can receive the principal amount without experiencing a loss on the initial purchase. Thus, the longer the bond maturity (assuming a change in the rate of interest), the greater the degree of risk.

CHAPTER III

INVESTMENT THEORY

Gross vs. Net Investment

In beginning a discussion of investment analysis, we must first clarify investment, net investment and gross investment. There is substantial agreement by writers on these definitions.

For our purposes, we are concerned with capital investment, as it relates to a business firm, which is synonymous with capital outlay. Thus, investment, per se, simply refers to the acquisition of a fixed asset, whether it be old or new, which is expected to yield a return, in excess of its cost, over a period of time. In acquiring ownership of this asset, it is necessary that one, in return, give up another (current or fixed) asset or acquire it at the expense of other(s). That is, in the absence of an exchange among parties directly affected, a third party must bear the cost of the asset in question.

This fixed or capital asset is known as producers' plant and durable equipment. It may be called capital outlay or capital outlay and equipment or producers' goods or real investment. Invariably, the meaning is the same. It represents those goods used in the further production of goods to be sold on the market, after completion, at some future date. The market goods are technically called consumer goods for they will ultimately be purchased by the public.

Buyers express preferences for commodities through the expenditures of dollars and/or through public opinion polls. As a result, these goods are produced and/or increased or decreased in quantity and sometimes in quality.

For original production, the producer must install certain equipment, after acquiring plant, which will enable him to produce these economic goods. Thus, the demand for producers' goods is a derived demand; derived from consumer preferences or consumer demand.

Gross Investment

Capital investment may be divided into two broad categories, namely, gross investment and net investment. The main difference between the two lies primarily within factors which comprise their composition. Gross investment includes, (a) the purchase of producers' durable equipment; (b) new construction which is synonymous with plants in the process of being built; (c) net foreign investment, which "is the net change in international assets and liabilities."[7] This net investment measures first, the excess of domestic goods sold abroad over purchases of foreign output and secondly, the production abroad of home owned (United States) resources over the production of resources in The United States owned by foreign industrialists; and (d) changes in business inventories which are shown annually in most corporation tax returns, accounting for about four-fifths of the estimate value of non-farm inventories.

Net Investment

Net investment is the net addition to capital equipment. Keynes points out that this addition can consist of fixed capital, which is a form of durable equipment, and/or working capital, which accounting-wise, is the

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7 United States Department of Commerce, National Income Supplement to the Survey of Current Business, Government Printing Office, 1951, p. 53.

difference between current assets and current liabilities, and/or liquid capital, often thought of as cash. Long-term planning probably enters into both gross and net investment decisions. However, when net investment is undertaken, it materializes primarily because of past profits with the idea that this trend (apparently upward) will continue for a definite period. Other factors, such as prices of goods and rates of interest, may be considered secondary even though they will have a bearing on the profit schedule. Net and gross investment are examined in Chapter V.

Factors Affecting The Level of Private Investment: Expectation and The Rate of Interest

Emerging from an examination of any type of investment will be factors which directly or indirectly affect the level of investment. The factors may be dependent upon or independent of each other. The factor most widely accepted by economists is expectation. The second factor, the rate of interest, is more subjective and hence, does not have as wide acceptance.

Before entering into a discussion of these two factors, certain subsidiary terms must be defined. They are national income, consumption and savings. Investments have previously been defined in this chapter. The meaning of these secondary terms represents nothing new but are defined for purposes of associating them with investment.

The first term, national income, is the aggregate earnings of labor and property which results from the production and sale of goods and services. This is the gross amount and is distinguished from net income by deducting depreciation, taxes and other forms of payment to the government. It may be called net or disposable income in that it represents the amount left or at one's disposal which is available for distribution at his discretion.

The amount will vary among individuals and sections of the country and will depend on the production realization of the economy. Net income has also been defined as that amount available for consumption.

Consumption is the value of goods and services consumed during a period. Savings is the excess of net income over expenditures on consumption. Income, being equal to the value of total output, is also equal to consumption expenditures plus expenditures on investment. Savings become the excess of income minus consumption and therefore, equal to investment. This is statistically shown in Table 3.

TABLE 3

SAVING DEFINED AS EQUAL TO INVESTMENT

Income		Value of Total Output		Consumption		Investment
600	=	600	=	400	+	200

Income		Consumption		Saving
600	-	400	=	200

Returning to our premise, we find that expectation or the anticipated net return is a universal factor of paramount importance (except to persons or organizations of the philanthropic type) when investments are under consideration. For example; entrepreneurs would not invest in capital equipment unless the expected return on such an investment was greater than the cost of this investment.

The firm is assumed to plan its investment in terms of the relationship between expected net returns on a new investment and the interest payment

necessary for the acquisition of the capital. Expectation and the rate of interest are the dominant factors affecting the level of private investment.

CHAPTER IV

INVESTMENT DEMAND

Changes in the Business Cycle

Introductory statements of (1) periods in a business cycle and (2) factors affecting investment, were introduced in Chapters I and III. In This chapter, an attempt will be made to broaden those concepts and, pari passu, show their effects on business cycle activity.

These basic terms tend to attach more significance to the micro economic analysis that we are presenting.[8] As we have seen, the four major periods of a business cycle are prosperity, recession, depression and recovery. During any one of these periods, there is a change in the economy. This change is of four types: seasonal, secular, cyclical and residual. By seasonal is meant those fluctuations which generally occur during a particular period of the year, such as those in construction, farming, etc. Secular trends represent long-term growth or decline in economic activity. For example; since 1930, the total amount of investment has been upward. Cyclical fluctuations have been designated to express the recurrent changes in economic activity which are not caused by seasonal, secular or random factors. Lastly, residual events are occurrences not covered by the previously named three. Two classical examples of the latter are (1) war and (2) a phenomenon, such as an earthquate, which is considered an act of God.

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[8] The micro analysis concerned with units or segments of the economy, as contrasted with macro economics which attaches significance to the economy as a whole.

We will start with investment expenditures which are assumed to be dependent primarily upon the marginal efficiency of capital. This is equal to the rate of return over the cost of the good or for the Keynesian analysis, it is the relationship between the expected net rate of return on a new capital asset and the rate of interest. When the rate of interest falls, the marginal efficiency of capital is increased usually, stimulating investment on the part of the entrepreneur. Simultaneously, the liquidity preference schedule of individuals is increased. As the entrepreneur expands investment, employment tends to increase. Later, income expands. With the continued purchases of capital outlay, the price of the capital good tends to rise due to a decrease in bank reserves and/or a decrease in the supplier's stock. This forces a decrease in the liquidity preference schedule, due primarily to a favorable outlook for profits, and hence a release of savings for investment purposes; which results in increased capital outlay. Incomes are increased, followed by an increase in consumption of some consumer goods. Now, the economy approaches a state of prosperity.

When investment ceases, the boom draws to a close, creating a period of recession which inevitably is succeeded by a depression. The cessation of these expenditures happens because of one or more factors. First, there apparently is no further need (presently) for capital outlay. Secondly, anticipated earnings are decreasing and thirdly, the cost of the good begins to overtake the selling price. For Keynes, the marginal efficiency of capital is or is becoming negative. It is a "sudden collapse in the marginal efficiency of capital,"[9] rather than a rise in the rate of interest

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[9] J. M. Keynes, op. cit., p. 315.

which brings the fall in the rate of investment.

To present another point of view, the boom could be the effect of underconsumption if we apply the acceleration principle. Since the demand for capital goods is a derived demand, demand for investment goods arises because of a demand by ultimate consumers. Under the acceleration approach, any increase or decrease in consumer expenditures brings about a greater increase or decrease of capital investment. This happens because the entrepreneur meets the initial consumer demand increase by greater expenditures on capital (assuming no idle outlay), which he believes will produce commodities to meet the future effective demand as anticipated from the present trend. If there is a leveling off of consumer expenditures, he curtails capital expenditures; since what he possesses is presumed to produce enough (along with existing stocks) for the existing effective demand. As consumer spending tapers off, capital investment is reduced by a greater proportionate amount.

Several positions may be presented in describing the movement from a depression period to a state of recovery. Schumpeter introduces the concept of innovations which stimulate investment. These innovations, representing forces outside of the market, appear en mass. They may consist of new products or new sales programs or new technological processes and are generally not available to all sellers in the short-run. As a result, sellers are rewarded in the form of "wind fall" profits. This indicates that the market, presently, is operating at something other than pure competition, since under purely competitive conditions, marginal cost would equate marginal revenue; a point representing the maximization of the profits of any given firm. When short-run or "wind fall" profits exist, marginal revenue exceeds marginal cost. If these innovations were available to all

sellers simultaneously, no short-run profits would exist. However, in the long-run, "imitators" follow, thereby reducing or causing these "wind fall" profits to disappear. Hence, they are reduced or tend to disappear as a consequence of all firms becoming more and more competitive. Marginal revenue then equates or approximates marginal cost.

Another approach which indicates the shift in the cycle phase is that of Keynes, supported, in effect, by Fisher. The upswing comes when businessmen anticipate profitability in capital outlays. The marginal efficiency of capital begins to increase. Investors grow optimistic; costs of construction are low; final inventories are liquidated and it becomes necessary to undertake some investment for repairs and replacement. Since consumption is given at the level of income, government expenditures may be needed to supplement private expenditures. Alvin Hansen sums this up very well:

> A society geared to a high peak load of capital-goods production is likely to experience violent fluctuations in income and employment. A high savings economy will remain a highly dynamic economy as long as it is able to experience periodically great bursts of capital outlays on plant and equipment. It is then a dynamic, rapidly expanding, and progressive economy, despite its instability. But if such an economy fails to find adequate investment outlets for its new savings and for its depreciation allowances, it will lose its dynamic quality and become a depressed economy, with a large volume of chronic unemployment, unless, indeed, the Government assumes a more positive role. The high savings economy, barring Government intervention, can escape a fall in income and employment only through the continuous development of new outlets for capital expenditures. As far as private-investment outlets are concerned, this requires continuous technological progress, the rise of new industries, the discovery of new resources, the growth of population, or a combination of several or all of these developments.[10]

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[10] Alvin H. Hansen, Fiscal Policy and Business Cycles (New York, 1941), pp. 346-347.

Therefore, it is almost certain that income, investment, consumption and government expenditures are interdependent variables, present in our economy, which serve to make it function as it does.

CHAPTER V

EMPIRICAL INVESTIGATION

Introduction

To begin the empirical investigation, the concept of capital outlay will be broadened in order that one may better understand its significance in relation to managerial decisions.

To appropriate a given amount for capital investment, such as plant and equipment, involves many factors which must be adjusted to long range planning. Since it is presumed first, that the return to this capital will be progressively forthcoming and secondly, that the outlay will be absolute [11] for long periods of time; it is mandatory that decisions pertaining to capital investment be of a long-run nature if the enterprise adheres to the law of profit maximization or minimization of losses.

One factor may be the approximate time length that any proposed plan would cover. Even though the long-run may be referred to as that period necessary for the entrepreneur to vary plant and equipment, it becomes necessary when actual planning begins, to think in terms of a time limit. During this planning period, the entrepreneur will decide if the plan of expansion should cover any given number of years in respect to the present or anticipated sales trend of the commoditie(s) produced by the industry in question. Secondly, there is the factor of capital requirements. How much should be expended and would it be available for such project? The

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[11] Absolute, as used here, refers to plant outlays as not normally possessing rates of movement, from source to source, as often or as steady as other factors; for example, income.

amount of capital required represents usually, the cost of the program. In the event of other programs, expansion or otherwise, the rationalization of funds would take place; the planners deciding if this project could be postponed or expenditures reduced in light of more urgent programs. Furthermore, there would be the task of computing the rate of return to each project and finally deciding if it would be feasible to carry out or abandon the less profitable ones.

Thirdly, how will the capital be supplied? There are two main sources, namely, internal and external. If internal, a problem arises as to the amount to be expended and that portion which will be retained. Externally, the company may be able to secure investment loans and/or resort to equity financing by turning over securities to brokers for sale.

Consequently, investments are inherently geared to long-run considerations. Moreover, the time from the point of origin to physical completion of the investment may be many weeks.

The present investigation examines seven firms. Four of the companies, United States Steel, Bethlehem, Republic and Inland, represent the steel industry. General Motors and Chrysler represent the automobile industry. The seventh, Pennsylvania, Ohio and Detroit Railroad Company, has been included to illustrate the tremendous capital outlay requirements for that type of organization. The Ford Motor Company, considered as one of the "big three" of the automobile industry, has been omitted from this study because of its private ownership; making it very difficult, if not impossible, to become acquainted with its financial records. Therefore, only two of the leading firms for the industry are analyzed. The investigation is for the years 1933-1939.

We have included the bond rating for some of the issues. Those bonds

without ratings were issued privately and/or did not possess all of the qualifications for a rating as prescribed by Moody. Bonds are rated from Aaa to Caa. Beginning with the former, such bonds possess the highest degree of investment quality. As the rating is progressively lowered, investment risk is progressively greater.

The bonded debt of companies, in the investigation, is generally that of the parent firm. Basically, it represents those issues which were relevant to the study.

We conclude the investigation with a correlation analysis showing the relationship between investments and rates of interest for the steel and automobile industries.

The Steel Industry

The steel industry, producer of the basic industrial metal (steel) and the largest single producer of cement, ranks among the most important in the country. Of the total primary metal output of all types in the United States, steel accounts for approximately 95 per cent. It is produced at a lower cost than competing metals and is not a homogeneous commodity; being available in more than 100,000 combinations of chemical composition, form, size and physical properties. Steel is considered as a raw material or a producers' good. Producers' goods, which are used in the further production of goods, are generally capable of providing services over longer periods of time than consumers' goods which depreciate or deteriorate relatively faster. Storage is a good example. Steel per se, can be stored for long periods without serious impairment.

Some factors that influence steel sales are consumer income, cost, stocks of durable goods, sale price of steel, etc. The latter, sale price,

is about the most important factor which influences the quantity of steel that will be sold. Entrepreneurs generally attempt to maximize profits. In calculating the price, the producer must consider, among other things, the amount of disposable income potential customers possess or will possess. Furthermore, an analysis is made to determine the portion distributed among the income class(es) most concerned with steel purchases. Closely allied with the selling price is the cost of production. The net gain or net loss is the difference between the cost and the selling price.

Since the industry produces the basic industrial metal and is further considered as the world's largest single producer of cement, industrial production is very high, with a mandatory huge investment in fixed capital. Inasmuch as the industry is dominated by three firms, this huge capital investment is concentrated. Moreover, by its nature and virtue of its size, the industry becomes a quasi-monopoly. This is further observable when one considers the huge capital requirements; making it theoretically impossible to have free entry into this particular market.

The States where most of the steel production is located are Michigan, Pennsylvania, Minnesota, Wisconsin and Alabama. They represent regions where most of the minerals used in making steel are located. Secondly, they are generally water areas. Thirdly, they are districts where many consumer products are made of or from steel. Hence, the shipping charges, if paid by consignor, are lower than they would be if steel were processed in other regions.

Capital Outlay

The industry operates on a mass production basis and therefore invests heavily in capital goods. The main equipment, such as blast furnaces and

open hearth furnaces cost about $2.5 million and $500,000 each, respectively. Under the former, ores are smelted whereas the latter are used primarily for regenerating properties.

Beginning in 1933, United States Steel, the largest firm in this group, expended $39 million for capital improvements. Their gross account for this particular year was over $2 billion (as exhibited in Table 10). Bethlehem, the second largest single producer of steel, had expenditures of $2 million; whereas Republic, considered as the world's third largest single producer of steel, recorded additions amounting to $6 million. Thus, the "big three" of steel accounted for about 94% of the total capital investment for the industry ($50 million) for this period. None of these companies issued bonds for 1933. However, at this time, they had ten and twenty year bonds outstanding; for the purpose of capital improvements. The total funded debt for the steel and iron industry for 1933 was $476 million.

For the year 1934, United States Steel again led the steel group in capital expenditures. The company spent $51 million. In 1933, approximately $44 million was appropriated from earnings for this purpose. Even though there was not a bond issue for the two years, it could reasonably be assumed that $7 million of the $51 million represented funds from long-term bond issues already outstanding. Bethlehem had expenditures of over $2 million for the second year, preceded by Republic with $9 million. During this year, only Republic floated a bond issue. It bore a $5\frac{1}{2}$ rate of interest and was issued in part payment for assets of the Corrigan-McKinney Steel Company. Like Bethlehem, it is difficult to estimate the amount spent from bond funds (on capital improvements), but it is practical to say that part of the total expenditure on such improvements represents funds from long-term bond issues. This assumption is based on previous

issues as shown in Tables 4,5,6 and 7. The Inland Steel Company registered a decline of $3 million in its capital account. Total funded debt was $458 million; a decrease of $18 million over the year.

In 1935, United States Steel expended approximately $58 million for additions to capital goods. Appropriations in 1934 (from earnings) were $45 million. Again, it may be presumed that about $13 million came from long-term bond issues. There is evidence of this upward trend in capital expansion by a quotation from the 1934 Annual Report of United States Steel Corporation:

> Changed conditions in the iron and steel industry during the last few years, both in respect of quality and character of steel demanded by customers, including broadening uses of alloy and special steels, together with revisions in type of mechanical mills evolved for treatment and rolling of steel which effect large reductions in current production cost but requiring greater capital investments, make it necessary for the subsidiaries to expend, during the next few years, large amounts for capital purposes...In February, 1935, there were appropriated $47,000,000 to be expended for these purposes,[12]

Bethlehem, for the same period, registered additions of $24 million. During this period, 1935, the company floated a twenty-five year $4\frac{1}{4}$ bond issue, the purpose of which was not recorded. The outstanding amount was $55 million as shown in Table 5. During the previous year, only Republic listed a bond flotation. This issue bore a $5\frac{1}{2}\%$ rate of interest. Thus, between the two firms, the rate of decline was $1\frac{1}{4}$ points. Though Republic recorded no bond issues for 1935, expenditures for additions were $11 million. Inland Steel also floated no bond issues but the company's capital account listed an increase of $5 million over the year. Total expenditures,

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[12] John Moody, Moody's Manual of Investments; Industrials (New York, 1935), p. 1178, quoted from the 1934 Annual Report of United States Steel Corporation.

for the industry at large, were $122 million. United States Steel accounted for 45.9% of this total (as deducted from Table 8) whereas, the "big three" expended about 76% of the total (as calculated from table 9). The total funded debt was $444 million.

For the year 1936, capital expenditures and bond flotations were accelerated. United States Steel continued to set the pace by expending $85 million or 42.5% of total capital expenditures for this period. Of the $85 million, $47 million represented appropriations from earnings in 1935. Thus, we presume that $38 million came from long-term bond issues.

Bethlehem's expenditures were $15 million or a decrease from last year of $9 million. During this period, the company floated a 3-3/4 bond issue; with $53 million outstanding. The net proceeds were used primarily to retire outstanding issues bearing a rate of interest of 5% and to provide for cost of future betterments and improvements. It was a thirty year, A rating issue which is included in Table 5. The price was not listed. The list of bonds retired from this issue were due, beginning with 1937 and extending through 1950. Thus, the corporation apparently believed that the rate of interest would not fall below 3-3/4% for at least the next fourteen years; at least, this is one assumption. Expenditures for Republic were $18 million, exceeding Bethlehem, the second single largest producer of steel, by $7 million. As may be seen from Table 6, at least a portion of this amount, for this and subsequent years, is from long-term bond issues since the company issued (several years back) ten, twenty and thirty year bonds for this purpose. Republic floated two bond issues, recorded in Table 6, during this year. Both were issued at a 4½% rate of interest. The purpose of the "Republic Steel Corporation-General 4½'s, Series B," was to redeem eight previous issues, due in 1936, which bore interest rates of 5,

5½, 6 and 7%. The other issue, Gulf States Steel Corporation-1st. (closed) 4½'s, sold at 99-1/16 and possessed a Baa rating. The purpose was threefold. First, to provide for cost of additions to the Gadsden Plant; secondly, to retire an issue of debenture 5's, and thirdly, for extensions, betterments and working capital. This callable bond bears a maturity date of 1961, making it a twenty-five year issue. During the same period, Bethlehem floated a 3-3/4% issue. The difference between Bethlehem's 3-3/4 issue and Republic's 4¼ issue may lie within the rating. The former possessed an A rating whereas the latter was a Baa. The meaning behind this is that the A bond was more firmly secured than the one with a rating of Baa. This security includes, among other things, the general position of the company, its earnings schedule, and its total outstanding debt; particularly in relationship to its current ratio. A brief synopsis of bond rating is included in the introduction of this chapter.

Inland's capital account for 1936 was $9 million or an increase from last year of $4 million. During the year, the company floated at least two bond issues; namely, "Inland Steel Company first 3's, Series C," and "Inland Steel Company first S.F. 3-3/4's, Series D." The former's maturity date began with 1937 and extended through 1946. The issue was for $10 million. The latter's maturity was 1961; a twenty-five year issue, with an outstanding amount of $35 million. The purpose of both issues was first, to redeem Series A (4½'s) due in 1978, and Series B (4½'s) due in 1981; and secondly, provide for other corporate purposes. The difference in interest rates, since both were A rating issues, apparently resulted in the time of issue; that is, the lapse of time between issues could have been of such nature that the market rate increased or decreased. Another possible reason lies within the method of selling. One could have been a private issue and/or sold to

a particular bank at a discount, etc. This could (also) have been the reason(s) for the difference in interest rates between Bethlehem's $3\frac{1}{4}$ and $4\frac{1}{4}$ issues, mentioned earlier, even though they bore different ratings. Total capital expenditures for the industry were $200 million. The four firms listed in this analysis accounted for about 63.5% of this total. The funded debt for the industry was $504 million; an increase of $60 million from 1935.

These firms under study, beginning with 1937 and moving counter clockwise, have shown steady increases in plant investment. This trend is based largely on the fact that all of them are engaged in programs of expansion which were completed by 1938. Included in Inland Steel's Annual Report of 1937, are data which help to verify this expansion movement:

> The program of construction for additions and improvements during the year 1937, including the building of a blast furnace..., a battery of coke ovens, a 44-inch 4-high strip mill with auxiliary facilities, and five additional hearth furnaces, with estimated annual capacity of 440,000 tons of ingots, is nearing completion and, in the main, can be placed in commission as soon as business conditions permit. This program was completed in 1938 and the new additions are now in operation. Expenditures for the additions and improvements made by your company and its subsidiaries for the year 1937 amounted to $23,296,098.[13]

Taking Inland first for 1937, we find that the company floated a bond issue bearing a 3% rate of interest. The rating and price are not given since the issue was sold privately to Kuhn, Loeb and Company at a discount of 1%. However, the purpose was to reimburse the company's treasury for capital expenditures made in 1936 and to provide funds for additional outlays on its properties in 1937. Thus, the amount expended in 1936 and

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[13] John Moody, Moody's Manual of Investments; Industrials (New York, 1939), p. 3057, quoted from the 1937 Annual Report of Inland Steel Corporation.

1937, included funds, the exact amount not registered, which came from long-term bond issues. The 3% rate is equal to one of the company's issues for 1936 and 3/4% lower than the other issue for the same period. Republic had expenditures of $39 million; an increase from 1936 of $21 million. This company floated at least three Baa bond issues during this period. They bore maturity dates of 1950, 1956 and 1961, with respective outstanding amounts of $70 million, $25 million and $137 million.

During 1937, Republic floated at least three Baa issues. The purpose of "Republic Steel Corporation General Convertible 4½'s Series A" was first, to redeem three outstanding issues bearing rates of interest of 5 and 7%, and secondly, for other corporate purposes. The purpose of Series B was threefold. First, for redemption; secondly, to reimburse company for 50% of cost of acquisition of $4,689,000 debentures of Trumbull-Cliff Furnace Company; and thirdly, to reimburse company for capital expenditures made or to be made after September, 1935. Series C was used for allocations to plant improvement and construction of new equipment. The company expended $39 million for additions to capital outlay, most of which apparently came from long-term bond issues. Bethlehem's capital expenditures for 1937 amounted to $45 million; an increase over the year of $30 million. It represents the largest amount of capital expenditures, recorded for Bethlehem, for the period of this investigation. We have no issue for U. S. Steel during 1937. The company issued, thirty years ago (as of 1939), several thirty, forty and fifty year bonds which are still outstanding. So sums for expenditures, representing funds from bond issues, have progressively resulted from previously authorized and subsequently issued bonds. This firm expended approximately $111 million during 1937 and like Bethlehem, Republic and Inland, it also represented the largest amount on capital

expenditures during the period of 1933-1939. In 1936, over $41 million was appropriated from earnings. Thus, we continue to assume that it is very easy to state the amount expended from bond issues for U. S. Steel; the amount for this year being $70 million or 35.1% of the total for the industry. Bethlehem followed with 14.2% and Republic had 10.1% of the total. The four firms, including Inland, had capital expenditures amounting to about 68.9% of the total for the industry. The total funded debt for the steel industry for 1937 was $496,954,000; a year's decrease of $8 million.

The effects of the expansion programs are seen from a general tapering off of investments for 1938. During the year, U. S. Steel issued its first and only bond for this period of investigation. It was a $3\frac{1}{4}$ debenture due 1948. $50 million was for "repayment" of bank loans and the other $50 million would be used for completion of new facilities. There was a decline of $48 million or 44% from 1937, in capital expenditures. The amount expended this year was $63 million, or 47% of the total for the industry. While expenditures for U. S. Steel declined 44%, total expenditures for the industry declined 57.5%. In 1936, the company appropriated $60 million for purposes of capital improvements. Thus, of the $63 million spent, only $3 million will be estimated as the amount received from bond issues. Bethlehem also had a decline in expenditures. The company expended only $7 million or 84% less than last year or 88.8% less than U. S. Steel spent for 1938. Following the downward trend, Republic spent $4 million on capital additions, representing an 89.7% decrease from 1937 or 93.6% less for the year than U. S. Steel. The "big three" of steel accounted for 56% of total capital expenditures for the industry. The funded debt for the industry was $667,374,000; an increase over the year of $171 million, as seen from data in Table 11. Thus, there was a decline in capital expenditures,

for individual firms, whereas the funded debt for the industry was increased. Although this is pointed out, it does not necessarily follow that the funded debt is associated entirely with capital expenditures.

United States Steel, for 1939, had capital expenditures of $88 million or an increase of 39.6% from 1938. Of this $88 million, $38 million was received from bond issues since $50 million was retained from previous earnings. Bethlehem floated no bond issues for this period. The company spent $11 million on capital improvements; thereby having an increase over 1938 expenditures of 57%. Neither Republic nor Inland registered any bond flotations for 1939. However, Republic's expenditures of $9 million were 125% more than the previous year. The three leading companies accounted for 75% of total expenditures. The total, $190 million, was 44% less than 1938. The funded debt for the industry was $651,908,000.

TABLE 4

UNITED STATES STEEL: BONDED DEBT
(1933-1939)

1. St. Clair Furnace Company First Gold 5_s, due serially to 1939. Dated 1910. Not callable; coupon. Outstanding: $580,000. Rating Aaa.

	Average Price					
1933	1934	1935	1936	1937	1938	1939
100	102½	104-7/8	106	103¼	104	

2. Illinois Steel Company Gold debenture $4\frac{1}{2}_s$, due 1940. Dated 1910; callable; coupon. Rating Aaa. Outstanding: $18 million.

	Average Price					
1933	1934	1935	1936	1937	1938	1939
100-3/16	105-3/8	107½	108¼	107-1/8	106	103

3. Tennessee Coal, Iron & R. R. Co., General Gold 5_s, due 1951. Dated 1901. Coupon; not callable; outstanding: $11 million. Rating Aaa.

	Average Price					
1933	1934	1935	1936	1937	1938	1939
101	109	117-3/8	123-1/8	120½	122-1/16	122½

4. American Steel & Wire Company of Alabama First Gold 5_s, due 1946. Dated 1916. Coupon; callable at 102. Outstanding: $1,422,000.

5. H. C. Frick Coke Company, Pittsburg, purchase money gold 5_s, due serially 1944; dated 1911. Coupon; outstanding: $6,482,000; Rating Aaa.

6. United States Steel Corporation Debenture $3\frac{1}{4}_s$, due 1948; dated 1938. Callable; coupon. Rating Aaa. Purpose: $50 million for repayment of bank loans; $50 million for completion of new facilities.

7. United States Steel Corporation, collateral Trust Gold 5_s, due 1951. Dated 1901. Not callable; coupon. Outstanding: $269,000.

TABLE 5

BETHLEHEM STEEL: BONDED DEBT
(1933-1939)

		Maturity	Outstanding	Rat.
1.	Bethlehem Steel Co., purchase money gold 6_s; not callable.	1978	$ 7,500,000	Aaa
2.	Bethlehem Steel 1st. lien & refunding gold 5_s.	1942	12,759,000	A
3.	Penn-Mary Steel Company First sinking fund gold 5_s.			
	Purpose: Issued as the purchase price of the properties and plants of the American Iron & Steel Mfg. Co., at Lebanon, Pa. and Reading, Pa.	1937	4,446,000	Baa
4.	Penn-Mary Coal Company first sinking fund gold 5_s; closed mortgage; callable; coupon.	1939	445,000	A
5.	Penn-Mary Coal Co., 1st. sinking fund gold 5_s (closed) callable; coupon.	1939	2,180,000	Baa
6.	Jamison coal & Coke Co., Dakota, 1st. s.f. gold 5_s; coupon; callable at 105	1934	176,000	A
7.	Finch Run Coal Co., purchase money sinking fund; gold 5_s closed; dated 1920; coupon; callable.	1950	3,156,000	Baa
8.	Lackawanna Steel Co., first consolidated A, gold 5_s, coupon.	1950	6,492,000	A
9.	Midvale Steel & Ordnance Company convertible sinking fund gold 5_s, dated 1916; coupon.	1936	31,507,000	A
10.	Pittsburgh-Westmoreland Coal Co., 1st. sinking fund gold 5_s.	1947	2,485,000	Baa
11.	Union Coal & Coke Co., 1st. s.f. gold 5_s.	1946	1,968,000	Baa

		Maturity	Outstanding	Rat.
12.	Manufacturer's Water Co., 1st s.f. 5s.	1939	$ 1,002,000	Baa
13.	Bethlehem Steel Company purchase money & improvement s.f. gold 5s dated 1916; callable.			
	Purpose: Issued to enable the Penn-Mary Steel Co., to finance the purchase of all the assets of the Penn. Steel Co., consisting chiefly of plants.	1936	22,304,000	A
14.	Bethlehem Steel Corporation Consolidated s.f. gold 5s Series C.	1981	--	--
15.	Pacific Coast Steel Corporation Serial Gold 5s, series A to J; dated 1929; coupon.	33-40	9,293,000	Baa
	Purpose: Issued in connection with the acquisition of the properties of Pacific Coast Steel Co., & Southern Calif. Iron & Steel Company.			
16.	McClintic-Marshall Construction Co., Collateral Trust gold 5½s.	33-37	9,826,000	Baa
17.	Bethlehem Steel Corp. Serial gold 4½s.	33-41	10,176,000	Baa
	Purpose: $8,200,000 issued in part payment for the properties and business of McClintic-Marshall Corp. Balance for other Corp purp.			
18.	Kalman Steel Co., 1st. mortgage gold 6s.	33-39	157,000	Baa
19.	Bethlehem Steel Corp. s.f. gold 4½s.	1960	55,000,000	A
20.	Bethlehem Steel Corp. s.f. issued 1936 Series E 3-3/4:	1966	53,022,000	A
	Purpose: Net proceeds used to retire entire outstanding amounts of: 1. Penn-Mary Steel 1st 5s due 1937 2. Finch Run Coal PM 5s due 1950 3. Pittsburgh-Westmoreland due 1947 4. Union Coal & Coke 5s due 1946 $3,000,000 used to provide for cost of future betterments & improvements.			

TABLE 6

REPUBLIC STEEL: BONDED DEBT
(1933-1939)

		Issued	Maturity	Outstanding	Rat.
1.	Donner Steel Co., 1st. PM 5s.	1915	1935	$ 619,000	Ba
2.	Central Steel Company 1st. s.f. gold 8s.	1932	1941	3,065,000	Ba
	Purpose: Issued in part, to pay for $3,500,000 current indebtedness.				
3.	Witherow Steel Corp. 1st s.f. gold 6s;				
	Purpose: Issued in part, to retire securities of predecessor company.	1932	1952	643,000	B
4.	Interstate Iron & Steel Co., first s.f. gold 5½s Series A & B; coupon; callable				
	Purpose: Series A - issued to refund outstanding bonded indebtedness.				
	Series B - issued to provide funds for additions.	1926	1946	---	Ba
5.	Republic Iron & Steel Co., refunding & G. s.f. 5½s Series A.				
	Purpose: To reimburse the company for additions and improvements.	1923	1953	6,267,000	Ba
6.	Republic Steel Corp. PM 1st. convertible 5½s.				
	Purpose: Issued in part payment for assets of the Corrigan-McKinney Steel Company.	1934	1954	15,361,000	Baa

		Issued	Maturity	Outstanding	Rat.
7.	Republic Steel Corp. Gen. $4\frac{1}{2}$s Series B.	1936	1961	$45,000,000	Baa

Purpose: Issued to redeem:

a. Republic Iron & Steel 5s 1936
b. Trumbull Steel Co. 6s 1936
c. Donner Steel Co. 7s 1936
d. Interstate Iron & Steel $5\frac{1}{2}$s at 101; 1936
e. Witherow Steel 6s (103) 1936
f. Steel & Tubes 6s (102) 1936
g. Trumbull-Cliffs 6s (105) 1936
h. Union Draw Steel (105) 1936

8.	Republic Steel Corp. Gen. $4\frac{1}{2}$s Series B; callable.	1937	1961	137,202,000	Baa

Purpose:

a. Redemption
b. Reimburse Co., for 50% cost of acquisition of $3,689,000 deb. of Trumbull-Cliff Furnace Company.

$4,997,500 to reimburse Co. for capital expenditures made or to be made after Sept. 1935.

1936 - $100\frac{1}{4}$ - $95\frac{1}{2}$

9.	Republic Steel Corp., Gen. Conv. $4\frac{1}{2}$s, Series A; callable.	1937	1950	70,070,000	Baa

Purpose: Issued (for redemption)

a. $2,846,000 Newton Steel 1st 7s
b. Donner Steel Company 5s
c. $1,881,000 Trumbull Steel Company deb. 7s
d. Other Corporate purposes.

		Issued	Maturity	Outstanding	Rat.
10.	Republic Steel Corp. Gen. $4\frac{1}{2}_s$, Series C; callable.	1937	1956	$25,000,000	Baa
	Purpose: $23,300,000 allocated to plant improvements & construction of new equipment. Balance for other corporate purposes.				
	1936 - 99-3/4 - 98-1/8				
11.	Gulf States Steel Corp. 1st. (closed) s.f. $4\frac{1}{2}_s$; callable; coupon.	1936	1961	6,192,000	Baa
	Purpose: Issued:				
	a. To retire deb. 5_s.				
	b. To provide for cost of additions to Gadsden plant.				
	c. For Extensions, betterments and working capital.				
	1936 - 99-3/8 - 98-3/4				

TABLE 7

INLAND STEEL: BONDED DEBT
(1933-1939)

		Issued	Maturity	Outstanding	Rat.
1.	Inland Steel Co., 1st. s.f. gold $4\frac{1}{2}$s; Series B; callable; coupon.	1931	1981	$14,000,000	--
	Purpose: Issued to reimburse Co., for expenditures made for the erection of a wide strip mill & for extensions & additions.				
	Average Price				
	1933-77½ 1934-95				
2.	Inland Steel Co. Series C, 3s.	1936	37-46	10,000,000	A
3.	Inland Steel Co. 1st. s.f. 3-3/4s, Series D; coupon; callable	1936	1961	35,000,000	A
	Purpose: Net proceeds of sale of C & D Series used as follows:				
	a. $14,145,000 to redeem on Feb. 1, 1936, at 102½, $13,800,000 1st. $4\frac{1}{2}$s, series B, due 1981.				
	b. $26,445,000 to redeem on Apr 1, 1936, 1st $4\frac{1}{2}$s due 1978.				
	c. Other corporate purposes.				
4.	Inland Steel Company 1st. s.f. 3s, series E; coupon; callable	1937	1952	10,000,000	--
	Purpose: Issued to reimburse the company's treasury for capital expenditures made in 1936 and to provide funds for additional outlays on its properties in 1937. Sold Privately to Kuhn, Loeb and Company NY at a discount of 1%.				

TABLE 8

ADDITIONS TO CAPITAL OUTLAY FOR
COMPANIES IN THE STEEL INDUSTRY
1933-1939
(In Millions)

	1933	1934	1935	1936	1937	1938	1939
U. S. Steel	$39	$51	$58	$85	$111	$63	$88
Bethlehem	2	2	24	15	45	7	11
Republic	6	9	11	18	39	4	9
Inland	-	-3	5	9	23	1	-1 *

TABLE 9

TOTAL EXPENDITURES FOR CAPITAL GOODS
IN THE STEEL INDUSTRY
1933-1939
(In Millions)

1933	1934	1935	1936	1937	1938	1939
$50	--	$122	$200	$316	$132	$190

* Years 1934-36, 38, 39 represent increases or decreases in total plant and equipment (on balance sheet) rather than necessary additions.

TABLE 10

GROSS REAL ESTATE, PLANT AND EQUIPMENT AS LISTED ON BALANCE SHEETS OF COMPANIES IN THE STEEL INDUSTRY 1933-1939 (In Millions)

	1933	1934	1935	1936	1937	1938	1939
U. S. Steel	$2,468	$2,965	$2,970	$2,231	$2,244	$2,244	$2,339
Bethlehem	745	719	736	732	774	791	790
Republic	307	305	346	360	384	384	389
Inland	73	70	75	84	102	105	104

TABLE 11

STEEL AND IRON INDUSTRY: FUNDED DEBT 1933-1939 (In Millions)

1933	$476,123
1934	458,465
1935	444,959
1936	504,929
1937	496,954
1938	667,374
1939	651,908

The Automobile Industry

Because of many technological innovations and the presence of top-flight managerial ability, the automobile industry has experienced a rapid growth in comparison with other industries. Such factors as credit regulations, increased disposable incomes and the increased number of households have influenced car demand. As a result of this expansion, the industry is generally the largest single consumer of such basic commodities as steel, iron, plate glass, leather upholstery and rubber. Illustrated in Table 12 are some of these primary materials and their percentage of total United States consumption.

TABLE 12

SOME RAW MATERIALS USED IN THE AUTOMOBILE INDUSTRY 1933-1939

Per Cent of Total U. S. Consumption

	Steel	Iron	Plate Glass	Leather Upholstery	Rubber
1939	18.1	51.0	75.0	68.0	80.0
1938	16.9	53.0	69.0	65.0	80.0
1937	20.0	54.0	72.7	67.0	80.0
1936	20.3	53.0	73.0	46.0	80.0
1935	24.8	54.0	76.0	31.0	75.0
1934	21.0	57.0	70.0	40.0	75.0
1933	19.2	55.0	40.0	54.0	73.0

Secularly, there is presumed to be a maximum number of cars that will be operated. This is primarily due to changes in ownership, replacement demand, state of confidence, prices of automobiles and operating cost. There is necessary a maximum ownership level at which potential owners

strive and existing owners, many times, hope to maintain. Such changes in ownership are inevitable because of non-static conditions in population, technological improvements and modernization of highways.

During the period of this study, 1933-1939, automobile purchases were upward as a result of a tremendous back log of orders and/or availability of disposable incomes. Prices, simultaneously, were increased. The replacement demand factor became increasingly important following the upward trend in purchases of new models. Later, cars previously bought, preceeded by recent models, began to depreciate rapidly while new models were introduced. At a particular point, consumers begin debate on replacement; some, with a view of buying "used" models to possess or attain ownership, others, to maintain or acquire confidence in their purchase. Whether a new or used replacement will materialize depends largely on disposable income, operating cost and of course, dealers' stocks, both new and used.

Quality is a big factor in determining the purchase of a new model. Generally conceived, the better the car qualitatively, the lower the operating cost; along with the psychological factor, increased prestige. Therefore, in addition to a level of maximum ownership, there is also an optimum of quality for which consumers strive. The attainment of this optimum, due mostly to rapid depreciation, tends to lag behind the realization of the ownership position.

When contemplating a purchase in the used car field, quality is included among several other dominant factors. First, financing is less because normally, the total cost is less, when considering a "trade-in," in comparison with a new model bearing the same name. Nevertheless, the allowance offered on the trade-in may influence the seller to seek other

dealers or keep his present vehicle longer; hoping that the trade-in value will increase or decrease less proportionately than depreciation or obsolescence will increase. If dealers' stocks are large, they tend to lower their trade-in allowance until their sales turnover increases. Instances where dealers did not tend to raise their trade-in allowances when stocks were low, existed immediately following World War II. Dealers became predominately purchasers of new models, later sold as used. The demand was so great (in relation to supply) that potential customers, for new models, traded in old ones with little or no concern on prevailing allowances but emphasis on securing a later style.

The industry thus, is dependent upon both the purchase of new as well as used cars. Preferences, substitutability and income disparity exert influences which contribute to this kind of impact.

Capital Outlay

Beginning with 1933, General Motors had an increase of $12,721,751 in their gross plant account, as per Table 13, which included additions to plant of $9,176,963 as shown in Table 14. Of the $9,176,963, $8,071,753 was plant reinstated which had previously been designated as idle. There is no available figure from Chrysler for additions to plant and equipment; however, the company's gross real estate, plant and equipment account declined by $1,287,315 because charges for depreciation and amortization, together retirements, exceeded expenditures on new facilities. This too, is illustrated in Table 13. General Motors registered no bond issues for this period. Chrysler acquired 6% debentures of Dodge. The funded debt for the industry was $41 million as compared with $476 million for the steel industry.

For the year 1934, General Motors expended $23,996,125 for plant outlay. Of this amount, $10,086,199 represented reinstatement of plant previously designated as idle. Since the company's funded debt was zero, the net increase in capital expenditures is presumed to have resulted from retained earnings and/or bonds previously floated and subsequently retired prior to this date.

Because the General Motors authorities believed tremendous potential demand existed for consumer goods in order to meet the unsatisfied desires of the public, General Motors decided during the year of 1935 to reorganize, readjust and expand its manufacturing facilities. For this purpose there was appropriated, $50 million. Also during the year, the company spent $51,160,000 for additions to plant. $7,540,000 of this amount was transferred from idle plant to active plant while $12,560,000 was transferred from active plant to idle plant; a net reduction of $5,020,000 in the gross plant account. For this same year, the company spent $27,163,875 more on plant improvements. Chrysler's capital expenditures for the year were $11,387,671. Neither company floated a bond issue; however, Chrysler retired the 1933 7% $2 million debentures of Dodge. Illustrated in Table 15 are expenditures for the industry, which were $130 million. Total funded debt was $21 million or 5% of $444 million for the steel industry.

At the end of 1936, General Motors continued to be optimistic with respect to expanded automobile purchases. The $50 million appropriation became a reality although total expenditures would be considerably (in the long-run) in excess of the amount originally proposed. Gross plant expenditures were $66,793,767, an increase during the year of $15,633,767. Thus, General Motors' expenditures represented 43% of the total ($153 million) for the industry. During this year, the company floated two bond issues;

$50 million 3_s and $50 million $4\frac{1}{4}_s$. The former is a ten year issue while the latter is for fifteen years. In view of their expansion program, we contend that net proceeds from these issues will primarily be used for capital expenditures. Gross additions, under Chrysler, amounted to $21 million, an increase of $10 million over plant expenditures for 1935. This $21,650,503 included, among other items, a new Desoto factory, a modern press plant, and the re-opening of a plant in Dayton, Ohio. The expenditures, along with General Motors, accounted for 56% of total expenditures for the industry. Hudson, another automobile firm, had serial 6_s maturing for the year. The total bonded debt for the industry was $15 million; a decrease of $6 million from 1935. As contrasted with the steel industry, this represented only 2.9% of the latter's funded debt.

Continuing to take the lead, General Motors Corporation, as a result of concluding that its present facilities were inadequate (particularly the Chevrolet Division), authorized expenditures of $61,725,000 for expansion and improvements. This amount is in addition to normal expenditures for tooling and plant rearrangement. The company expended $44,150,000 for 1937; $22,643,676 less than expenditures for 1936, or a decrease of 50%. Chrysler spent $21,915,325 for such purposes. Total expenditures for the industry were increased by $6 million. None of the companies floated bond issues. Nevertheless, Hedson had an issue of serial $4\frac{1}{2}_s$ maturing during the year. This is illustrated in Table 16. The funded debt was decreased by $1 million. The steel industry's debt also showed a decrease; the amount being $8 million. Notwithstanding this, the funded debt for the automobile industry (Table 17) was still 2.9% of the debt for the steel industry.

During the latter part of 1937 and the first half of 1938, there was a

sharp decline in business activity in the United States. This decline became a major concern of all industries. It is difficult to pin point any factor(s) but the recovery period was partly affected by a decrease in consumption. Simultaneously, producers generally believed that 65% of the production equipment involving the metal goods industries was ten years old. Thus, at this time, a large part of America's producing plant was obsolete.

Beginning with the second half of 1938, a reversal took place causing the general trend of business activity to move forward. General Motors expended $32 million on plants; a decrease from 1937 of $12 million. Chrysler spent $18,246,448; or a decrease of $3 million. Expenditures for the industry were $155 million or $4 million less than 1937. Emphasis apparently has been shifted from plant expansion to evolution and technological progress of the industry. Graham-Paige had bonds, 1st 6_s maturing for 1938, but there were no recorded issues for the industry. The bonded debt for automobiles was $12 million or a decrease of $2 million; whereas the bonded debt for the steel industry was $667 million or an increase of $171 million.

An examination of 1939 for this industry, reveals that business activity declined at the beginning of the year and resumed its upward movement towards the end. Since new models are generally introduced during the early months of a year, potential consumers may delay purchasing in order to secure a later model. This may be one factor, previously not mentioned, which causes automobile sales to be relatively low at the very beginning and end of a year. The upswing for the last months of 1939 may have been accelerated by the crisis in Europe. Fearful of government restrictions on production of commodities in the metal industries, buyers

made purchases which ordinarily would have been delayed.

General Motors produced, and/or added among other things, the Hydra-Matic Drive which is evidence of the emphasis placed on innovation. As a result, plant expenditures were $37 million or $5 million more than 1938. The primary reason for this increase was to maintain the efficiency of the company's production facilities with advancing technology. Expenditures of $16,241,106 were recorded by Chrysler. This amount is $2 million less than 1938. Total capital expenditures for the industry were $135 million or $15 million less than 1938. General Motors and Chrysler accounted for 39% of this total. No bonds were issued for this period. The funded debt for the automobile industry was reduced by $4 million. The $651 million funded debt of the steel industry represented a decline of only $16 million. Thus, the $8 million funded debt for the automobile industry was a fraction (1.3%) of the debt of the steel industry.

TABLE 13

GROSS REAL ESTATE, PLANT AND EQUIPMENT AS LISTED ON BALANCE SHEETS OF COMPANIES IN THE AUTOMOBILE INDUSTRY 1933-1939 (In Millions)

	1933	1934	1935	1936	1937	1938	1939
General Motors	$512	$541	$592	$690	$747	$758	$769
Chrysler	128	129	114	117	116	118	115
Packard	45	35	35	35	35	31	28
Studebaker	67	67	67	16	18	19	19
Hudson	24	22	20	19	18	18	17

TABLE 14

ADDITIONS TO CAPITAL OUTLAY FOR COMPANIES IN THE AUTOMOBILE INDUSTRY 1933-1939 (In Millions)

	1933	1934	1935	1936	1937	1938	1939
General Motors	$9	$23	$51	$66	$44	$32	$37
Chrysler	-	-	11	21	21	18	16

TABLE 15

TOTAL EXPENDITURES FOR CAPITAL GOODS IN THE AUTOMOBILE INDUSTRY 1933-1939 (In Millions)

1933	1934	1935	1936	1937	1938	1939
$48	$78	$130	$153	$159	$155	$135

TABLE 16

FIRMS IN THE AUTOMOBILE INDUSTRY: FUNDED DEBT
1933-1939

		Rating
1.	General Motors - a. $50,000,000 3_s dated 1936 due 1946	
	b. $50,000,000 $3\frac{1}{4}_s$ dated 1936 due 1951	

Average Price

	1936	1937	1938
a.	$104\frac{1}{2}$	$101\frac{1}{2}$	103
b.	104	$101\frac{1}{2}$	$103\frac{1}{2}$

2.	Chrysler - 6% debentures of Dodge dated 1933 Authorized: $2,000,000. Retired 1935.	
3.	Hudson - a. $4\frac{1}{2}_s$, due 1937-'40	
	b. 6_s, due 1936-'40	
4.	Graham-Paige - a. 1st 6_s, due 1937	B
	b. 1st 6_s, due 1938	B
	c. 1st 6_s, due 1943	Caa
5.	Studebaker - a. 6_s, dated 1932 due 1942 ($46\frac{1}{4}$-$20\frac{1}{4}$)	Caa
	b. 6_s, dated 1935 due 1945	B

Average Price

	1935	1936	1937	1938	1939
b.	$104\frac{1}{2}$	68	$108\frac{1}{2}$	$66\frac{1}{2}$	$88\frac{1}{2}$

TABLE 17

AUTOMOBILE INDUSTRY: FUNDED DEBT
1933-1939
(In Millions)

1933	1934	1935	1936	1937	1938	1939
$41	$32	$21	$15	$14	$12	$8

Pennsylvania, Ohio and Detroit Railroad Company

The Pennsylvania, Ohio and Detroit Railroad Company operates trains in Ohio and Michigan. The total miles of track in 1933 was 1,514.16 as compared with 1,437.20 in 1939. The company floated one bond issue during the period of 1933-1939. Net proceeds of previous bond issues (Table 18) were primarily used for capital expenditures.

Expenditures on plant outlay for this company (as in most railroad companies) have been tremendous, as illustrated in Table 19. Beginning with 1933, the company had capital expenditures of $598.7 million. This was increased by approximately $83 million for 1935. For 1936, there was an increase of $100 million. Thus, the $783 million is about seven times the amount for the automobile industry and three times that of the entire steel industry. Pennsylvania expended $826.7 million for 1937; an increase of $46 million. For 1938 and 1939, the company's capital expenditures declined to levels approximating the 1935 and 1936 rates. This trend was also noticeable in the automobile and steel industries.

TABLE 18

PENNSYLVANIA, OHIO AND DETROIT RAILROAD COMPANY:
FUNDED DEBT
1933-1939

	Issued	Maturity	Rating
1. Penn., Ohio & Detroit R.R. Co., 1st & refunding gold $4\frac{1}{2}$s series A; callable	1927	1977	Aa

Purpose: Issued for capital expenditures, for retiring obligations and for other corporate purposes.
Outstanding: $28,483

Average Price

1933	1934	1935	1936	1937	1938	1939
82	$94\frac{1}{2}$	$104\frac{1}{2}$	$105\frac{1}{4}$	$103\frac{1}{4}$	$93\frac{1}{2}$	$96\frac{1}{2}$

2. Penn., Ohio & Detroit R. R. Co., 1st & refunding gold $4\frac{1}{2}$s series B. Outstanding: $3,943,000.	1931	1981	Aa

Purpose: Issued to Penn. R.R. in partial reimbursement for expenditures and capital advances.

3. Penn., Ohio & Detroit R.R. Co., $4\frac{1}{2}$s; callable Issued in settlement of indebtedness.	1934	1984	Aa

TABLE 19

ADDITIONS TO CAPITAL OUTLAY FOR
PENNSYLVANIA, OHIO AND DETROIT RAILROAD COMPANY
1933-1939
(In Millions)

1933	1934	1935	1936	1937	1938	1939
$598.7	$637.5	$681.9	$783	$826.7	$676.5	$765.9

CHAPTER VI

SUMMARY AND CONCLUSIONS

In examining the nature of interest, three principal points are introduced; namely, the definitions of interest and interest rates; various approaches to the determination of interest rates; and the relationship between short and long-term interest rates.

Interest is the price or amount paid for the use of borrowed funds or their equivalent. It becomes a part of the principal or amount granted as the loan. The rate of interest is a ratio or percentage of the payment for any given loan per unit of time. The real and nominal rates are the two rates introduced. The nominal rate is the quoted rate whereas the real rate is the actual rate which is higher than the former. In Chapter II, we have tried to explain that the term, "the interest rate," is used to mean a family of rates rather than an absolute rate.

Alternative approaches to the determination of the interest rate was the next area of discussion. These approaches are classified under monetary or classical and non-monetary or anti-classical. The first group comprises the liquidity preference theory and the loanable funds theory. The former embodies a money concept whereas the latter is predicated upon loans. The theories are based on the demand for and supply of money or loanable funds. Keynes' liquidity approach is based on three motives; namely, Transactions; Precautionary and Speculative. The first two motives are functions of income while the third motive is a function of the rate of interest. Their purpose is to explain why money is held at any given time. The rate of interest is said to be that point at which the demand for and supply of

money or loanable funds are equated. For Keynes, it will not fall below zero.

The time preference and productivity theories represent the non-monetary group. Suggested in the first principle is a preference for present over future goods. To forego immediate consumption, the potential consumer must receive a reward. This reward is an interest payment. The rate, as suggested by proponents of this theory, will be positive. The productivity theory of capital is the second principle under the non-monetary group. The rate of interest is determined by the marginal net physical productivity of capital.

The final point discussed in Chapter II is the distinction between the short and long-term interest rate. Even though subsidiary factors are mentioned, the primary difference is the element of risk. A comparison is made between the short and long-term bond, illustrating the greater risk attached to the latter.

Next, we discuss the theory of investment. A distinction is made between gross and net investment, followed by an examination of factors affecting private investment. This difference has been explained in terms of the composition of these two. Gross investment is composed of producers' durable equipment, new construction, net foreign investment and changes in business inventories. Net investment is net addition to capital equipment.

Major factors affecting the level of private investment are expectations and the rate of interest. Entrepreneurs tend to seek that level of investment which yields them the greatest net return. However, a fluctuation of the interest rate may adversely affect the expected yield. An example of a long-term 4% bond, selling for $100, is given in Chapter III.

Another prerequisite to an understanding of the long-term interest

rate and its effect on capital investment is investment demand. In Chapter IV, the attempt has been made to broaden the concepts, of both the business cycle and those affecting the level of private investment, by showing their effect on changes in the business cycle. Economic fluctuations are discussed; followed by a transition from prosperity to a depressed economy. Two causes are given for this transition. The first cause is the Keynesian description of a collapse in the marginal efficiency of capital. There is a decrease in the net return to investment; hence, a tapering off or cessation of capital investment. The acceleration principle is applied to the second cause. From this, it is presumed that underconsumption brought about an accelerated decrease in capital expenditures. In moving to a state of recovery, we have suggested at least two approaches. The first approach is the favorable outlook for profits; the liquidation of final inventories; and the initiation of replacement expenditures. The second method involves Schumpeter's innovation theory of introducing technological improvements, new sales schedules, new products, etc.

The empirical investigation is concerned primarily with the leading firms in the automobile and steel industries. A seventh firm under railroads, is included to illustrate the huge capital requirements for that type of organization. The period of study is seven years: 1933-1939. To conclude the investigation, we present a correlation analysis which shows the relationship between investment and rates of interest for the steel and automobile industries.

In addition to the production of steel, the steel industry is the world's largest single producer of cement. It is an industry controlled chiefly by three firms, namely, United States Steel, Bethlehem and Republic Steel. Capital requirements for the industry are relatively high.

The automobile industry is also dominated by a so-called "big three." The leading producers are General Motors, Chrysler and Ford, who form a nucleus in the industry making it generally the largest single consumer of such basic commodities as steel, iron, plate glass and rubber. The market is one where rapid turnover of used cars is essential to the successful selling of new models.

For 1933, total expenditures for the automobile industry amounted to $48 million as compared to $50 million for the steel industry. The Pennsylvania, Ohio Railroad Company alone, had expenditures of $598.7 million. Such tremendous expenditures for this railroad company are feasible since the majority of assets of railroad companies are held in the form of capital equipment. Practically all of the expenditures (railroad), for this and subsequent years, were made from funds representing the flotation of long-term bonds. Most of the expenditures under the steel industry were made possible from funds of long-term bond issues. Capital expenditures for the automobile industry (throughout the investigation) were generally evenly divided between funds from long-term bond issues and retained earnings.

During 1935, capital expenditures for the automobile industry were increased by $82 million or 62% over the two year period. The steel industry expended $122 million or an increase of $72 million over the same period. Total expenditures for the automobile industry exceeded those of the steel industry by $8 million.

In 1936, the automobile industry expended 76.5% of the amount spent by the steel industry. Expenditures for the steel industry rose by 39% over the year while the automobile industry had an increase of 15.9% from 1935. The railroad company's expenditures were increased by $102 million or 13%.

The automobile industry, for 1937, had expenditures of $159 million or only $4 million more than 1936, whereas the steel industry registered a 68% increase. This happened because all firms in the industry expended more in 1937 than for any previous or sebsequent year (1933-1939). Pennsylvania Railroad continued to show an increase. The company had expenditures of $826.7 million; an increase of $43.7 million.

Previously, all of the firms in the two industries have been engaged in expansion programs. The completion or near-completion of these programs are observable by a tapering off of capital expenditures during the next two years. For 1938 and 1939, the automobile industry had expenditures approximating the 1936 and 1935 levels. Expenditures for the steel industry were $63 million and $88 million respectively. The Pennsylvania Company had expenditures equivalent to the 1935 and 1936 levels.

The funded debt for the steel industry fluctuated during the period (1933-1939), whereas it continued to decrease in the automobile industry. This debt, for the steel industry, was generally four-hundred times that of the automobile industry. It is understandable since the steel industry is primarily a capital goods industry whereas the automobile industry engages principally in the transformation of goods (capital) into other goods (consumer).

Capital expenditures for the steel and automobile industries, for 1933-1939, represented new additions and/or the reinstatement of idle plant to active plant. There were instances of decreases in the net amount of capital expenditures where depreciation and retirements exceeded expenditures on new facilities. Capital expenditures for the Pennsylvania, Ohio and Detroit Railroad Company (1933-1939) were equivalent to like expenditures for

the steel industry. Outlay for railroads, which is abundant, is composed chiefly of "rolling stock;" of which the rate of depreciation is relatively high.

When expectations were relatively high, entrepreneurs organized and/or carried out expansion programs irrespective of the rate of interest. When businessmen anticipated sharp decreases in expected returns on new outlays, capital expenditures were generally reduced regardless of the rate of interest on long-term securities. However, practically all bond indentures included a callable clause. Thus, when the market rate of interest decreased, bonds (outstanding) were called and subsequent issues, at the new low rate, were floated.

APPENDIX A

CORRELATION ANALYSIS

TABLE 20

LONG-TERM RATES AND CAPITAL EXPENDITURES: THE AUTOMOBILE INDUSTRY

(In Millions)

Years	Rates (Av.)	Expenditures (Capital)
1933	6	48
1934	5.8	78
1935	5.5	130
1936	3.5	153
1937	3.3	159
1938	3.2	155
1939	3.2	135

TABLE 21

LONG-TERM RATES AND CAPITAL EXPENDITURES: THE STEEL INDUSTRY

(In Millions)

Years	Rates (Av.)	Expenditures (Capital)
1933	6.2	50
1934	6	40
1935	5.7	122
1936	5	200
1937	4.5	316
1938	3.5	132
1939	3.5	190

The coefficient of correlation for the steel and automobile industries was negative; that is, at lower rates of interest, capital investment tended to increase and vice-versa. The correlation for the steel industry (-.255), suggests a very low relationship between capital investment and rates of interest. The correlation for the automobile industry (-.842), suggests a relatively high relationship between changing rates of interest and capital expenditures.

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